

Marked-up version of claims as amended.

1. A roll for dewatering a web in a paper or board machine comprising axle journals [(13A,13B)] supported by which the roll is arranged to revolve, end flanges [(12A, 12B)] to which the axle journals [(13A, 13B)] are connected, a mantle [(11) which is] having an outer surface, the mantle being connected to the end flanges [(12A, 12B)] and [into which mantle (11)] a number of openings extending through the mantle [(11)] [and/or] or recesses [(15)] formed into the outer surface of the mantle [have been made], which openings [and/or] or recesses form a regular pattern, [**characterized** in that] and solid connecting portions in the outer surface of the mantle (11) around said openings, which are preferably holes, [and/or] or around said recesses, which are preferably blind-drilled bores [(15)], are opened so that, from each opening [and/or] or recess or from their countersink [(15)], there is a connection, provided in the form of a groove or an additional recess [(16,17,40,41,30,50)] extending into the outer surface of the roll mantle [(11)], with at least each of the openings [and/or] or recesses or their countersinks [(15)] closest to it.

2. A roll as claimed in claim 1, [**characterized** in that] wherein a double grooving [(16,17)] is formed into the outer surface of the roll mantle [(11)] such that the first grooving [(16)] connects a row of holes [and/or] or blind-drilled bores or their countersinks [(15)] in a first direction [(S1)] and the second grooving [(17)] connects a row of holes and/or blind drilled bores or their countersinks [(15)] in a second direction [(S2)] which crosses the first direction [(S1)], whereby separate support points [(18)] supporting the wire and situated between the holes [and/or] or blind-drilled bores or their countersinks [(15)] are formed into the outer surface of the roll mantle

[(11)].

3. A roll as claimed in claim 1, **[characterized in that]** wherein a double grooving [(40,41)] is formed into the outer surface of the roll mantle [(11)] such that the first grooving [(40)] is made in a first direction [(S1)] between a row formed of holes [and/or] or blind-drilled bores or their countersinks [(15)] and the second grooving [(41)] is made in a second direction [(S2)] between a row formed of holes [and/or] or blind-drilled bores or their countersinks [(15)], which second direction [(S2)] crosses the first direction [(S1)] the holes or blind-drilled bores or countersinks having an edge, whereby separate support points [(42)] supporting [the] a wire running on the roll mantle and situated at the edges of the holes [and/or] or blind-drilled bores or their countersinks [(15)] are formed into the outer surface of the roll mantle [(11)].

4. A roll as claimed in claim 1, **[characterized in that]** wherein circular grooves [(30)] are formed into the outer surface of the roll mantle [(11)] around the holes [and/or] or blind drilled bores or their countersinks [(15)] said circular grooves having a center radius of their circumference.

5. A roll as claimed in claim 4, **[characterized in that]** wherein the [centres] centers of the circular grooves [(30)] coincide with the [centres] centers of the holes [and/or] or blind-drilled bores [(15)] and the [centre] center radii of the circumference of the grooves [(30)] are equal to the distance between the [centres] centers of the holes [and/or] or blind-drilled bores [(15)] so that the grooves [(30)] form channels that connect the holes [and/or] or the blind-drilled bores

[(15)].

6. A roll as claimed in claim 1, [characterized in that] wherein additional blind-drilled bores [(50)] are made into the outer surface of the roll mantle [(11)] between the holes [and/or] or blind-drilled bores or their countersinks [(15)] such that the additional blind-drilled bores [(50)] have a connection to each of the holes [and/or] or blind-drilled bores or their countersinks [(15)] closest to it.

7. A roll for dewatering a web in a paper or board machine comprising:
a roll mantle having an outer surface;
a plurality of bores extending through said roll mantle, each of said bores being spaced from an adjacent one of said bores to define a space there between; and
a plurality of recesses formed in the outer surface of said roll mantle for connecting each bore with at least another one bore adjacent to said bore to thereby permit a flow to travel between said bores
[means for interconnecting selected ones of said plurality of bores for permitting a flow to travel between said selected bores].

9. The roll according to claim [8] 7, wherein said plurality of [linear] recesses comprises [at] a first groove for interconnecting a first group of selected bores of said plurality of bores and a second groove for interconnecting a second group of selected bores of said plurality of bores.

11. The roll according to claim 9, further comprising a plurality of support points for [support] supporting a wire, said support points being arranged between adjacent ones of said plurality of bores.

14. The roll according to claim 7, wherein said recesses [means] for [interconnecting selected ones of said plurality of bores] connecting each bore with at least another one bore adjacent to said bore comprises a plurality of circular grooves arranged in said outer surface, each one of said circular grooves being arranged to encircle a respective one of said plurality of bores and wherein a circular groove encircling one bore is arranged to extend over each adjacent bore.

REMARKS

Entry and consideration of the following amendments and remarks is respectfully requested.

Claims 1-7, 9-11 and 13-14 are pending claims 8 and 12 having been canceled and claims 1-7, 9, 11 and 14 having been amended herein.

Claim Rejections Under 35 U.S.C. §112, Second Paragraph

Claims 1-6 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Claims 1-6 have been amended herein to more clearly recite the invention. In view of the amendments to claims 1-6 it is submitted that the Examiner's rejections have been overcome.

Claim Rejections Under 35 U.S.C. §102 and §103

Claims 1 and 7-8 were rejected under 35 U.S.C. 102(b) as being anticipated by Aula. Claims 2-5 and 9-14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Aula as applied to claims 1 and 7 above and further in view of Millspaugh. Claims 6 and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Aula as applied to claims 1 and 7 and further in view of Gordon. The Examiner's rejections are respectfully traversed.

The problem the present invention seeks to address is the marking of the web due to large unbroken connection areas between the holes or their countersinks in prior art roll mantles.

This problem is solved so that a plurality of recesses are formed in the outer surface of the roll mantle so that each bore is connected with at least each bore adjacent to it.

Our invention can be used at least in a roll having:

- holes going through the mantle and no countersinks, or
- holes going through the mantle and countersinks around the holes, or
- blind drilled holes and no countersinks, or
- blind drilled holes and countersinks around the blind drilled holes, or
- holes going through the mantle and blind drilled holes and no countersinks, or
- holes going through the mantle and blind drilled holes and countersinks around the holes and the blind drilled holes, or
- holes going through the mantle and blind drilled holes and countersinks around the holes or the blind drilled holes.

The cross-section of the holes, blind drilled holes, the countersinks does not have to be circular. It can be of any form.

The essential aspect of the invention is the presence of recesses in the outer surface of the roll mantle so that you get flow connections between adjacent holes or blind drilled holes or equivalent openings or their countersinks. The recesses can be grooves, but they can also be of any other shape.

This is achieved e.g. in the embodiment shown in Fig. 2 by making two crossing grooves 16, 17 going over the openings 15 into the mantle so that only small square-shaped support portions 18 extending to the outer surface of the mantle are left in order to support e.g. a wire running on the roll mantle. There is thus a free flow connection between each opening 15 and at least each opening 15 adjacent to it.

The roll shown in Aula is a vacuum cylinder to be used in the drying section of a paper machine in locations at which the paper web runs outermost on a drying wire. The web is made to adhere to the wire face by means of negative pressure. Thus, by means of this arrangement, the running of the paper web in the drying section is supported. (See, e.g. column 3, lines 11 -18). The roll described in Aula is thus not used for removal of water from the web.

It would not even be possible to use the roll described in Aula in the wet end to remove water from a web. This is due to the fact that the suction capacity is too low, the holes are too small and the distance between the holes is too big. The open surface is too small in order to remove water from a web. Also the configuration of the holes and the grooves is such that it would mark the web making the web useless. It does not matter if there are circumferentially fitted grooves (see. Fig. 2D) or if there is one groove which runs in spiral shape across the entire width of the roll (column 4, lines 39-45), the roll described in Aula cannot be used for removal of water from a web.

The actual invention in Aula is to have partition walls inside the roll in order to divide the suction zone in the cross direction into at least three vacuum spaces. The vacuum is higher in the lateral parts of the suction zone than in the middle part of the suction zone. This is a feasible feature in the drying section in order to reduce the shrinkage of the paper web of its lateral area and to equalize the shrinkage across the entire width of the paper web. (See, e.g., column 1, line 66 - column 2, line 11).

One of the most important features in our roll is the plurality of recesses formed in the outer surface of the mantel so that each bore is connected with at least each bore adjacent to it permitting a flow between the bores. This is not the case in Aula. It is seen e.g. from Fig. 2D that there are two wall portions extending to the outer surface of the roll between each row of holes. There is thus no connection in the lateral direction between two rows of holes. This will also be the case when using a single groove in the spiral form in Aula.

The idea in Millspaugh is to first bore holes 2 in the shell after which the holes are counterbored, circularly, in their outer ends (Fig. 1a). The counterbores reduces considerably the imperforate area between the perforations shown in Fig. 4 and provides an inclined or beveled countersunk wall 4 substantially concentric with the respective bore. The preliminary circular countersinks thus provided is then completed by reshaping with non-circular countersink punch, stamp, or other suitable means of any desired construction. (See, page 2, lines 106-124).

The adjacent countersinks extend the total effective suction area to include all otherwise waste space lying between the ends of the old cylindrical perforations leaving only a fine continuous rib-like wall 5 between adjacent countersinks (Fig. 6). The rib-like wall 5 provides a complete network of bar surface for the uniform support of the pulp carrying medium. (See, page 3, lines 44-52). Each bore in Millspaugh is thus isolated from the adjacent bores by means of the solid connection portions 5 which extend to the outer surface of the shell.

The statement made by the Examiner on page 3 in the office action that Millspaugh discloses a row of holes and grooves crossing another row of holes and grooves is traversed. There are only bores and countersinks, but there are no grooves in Millspaugh. The thin lines which do not have any reference number shown in Fig 4 might have mislead the Examiner. These thin lines extending from the bores 2 to the corners of the wall 5 in Fig. 4 denote that the countersinks wall 4 is beveled.

Gordon discloses a roll for a press couple for dewatering a web in a papermaking machine. The shell has drilled suction holes extending radially fully trough the shell and interspersed between the suction holes blind drilled holes extending only a partial way into the shell.

There are thus large unbroken connection areas between the suction holes and the blind drilled holes in Gordon. Each suction hole or blind drilled hole is not connected with at least each suction hole or each blind drilled bore adjacent to it as is the case in our invention.

It is further submitted that it would not be obvious to one combine the references in the manner suggested by the Examiner since they relate to completely different technological fields and the problems to be solved by the inventions disclosed in the references have nothing in common.

Aula relates to a suction roll/cylinder to be used in the drying part. The roll is used to support the web in the drying part, not to remove water from the web. The problem to be solved in Aula is to reduce the shrinkage of the paper web of its lateral area and to equalize the shrinkage across the entire width of the paper web.

Millspaugh relates to a suction roll for removal of water from the web. The problem to be solved in Millspaugh is to increase the operative area in the outer surface of the shell.

The starting point in a combination would be Millspaugh and the problem to further increase the open area in the shell. A person skilled in the art would then look at Aula he would learn that you can make grooves in the shell in order to spread the vacuum from the holes to the groove, i.e. to a larger area in order to keep the web on the wire. Even if he would substitute the countersinks in Millspaugh with grooves from Aula he would not arrive at our invention. He would not have a connection from each bore to at least each bore adjacent to it permitting a flow to travel between said bores.

In view of the above it is submitted that the cited references fail either singularly or in or combination to disclose the claimed invention and/or render the claimed invention obvious.

In view of the changes made to the claims and the arguments presented above it is respectfully submitted that the Examiner's rejections of the claims have been overcome and should be withdrawn.

If any changes to the specification and/or claims are deemed necessary to place the application in condition for allowance, the Examiner is respectfully requested to contact the undersigned to discuss the same.

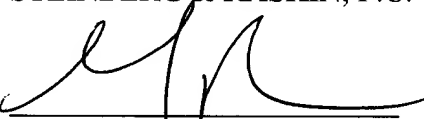
It is believed that this communication is being timely submitted. However, in the event that it is untimely and extension fees are required, this is to be considered a petition for extension and the Commissioner is hereby authorized to charge any requisite fee to Deposit Account No. 50-0518.

Respectfully submitted,


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